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NetworkRail

System Operator

West Coast Main Line South – Fast Lines Timetable Capacity Assessment

Advanced Timetable Team

05/02/2025

Final V1.3

On the side of passengers and freight users

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Abbreviations	
Acronym	Meaning
ESG	Event Steering Group
GUT	Grand Union Trains – now First Rail Stirling
NW&C	North West & Central Region
ORR	Office of Rail and Road
SX	Monday-Friday
T-3	Time to 3
Tpd	Trains per day
Tph	Trains per hour
TPRs	Timetable Planning Rules
WCML	West Coast Main Line

Overview and purpose

This timetable capacity assessment was completed by the Advanced Timetable Team, Capacity Planning, in partnership with the North West and Central Region. It focusses on the West Coast Main Line (WCML) Fast Lines, on the West Coast South between London Euston (exclusive of platforming) and Rugby and is based off the current weekday (SX) timetable structure identifying pathing opportunities within the structure.

It does not consider the impact of any other interacting traffic, for example with the Slow Lines.

It also does not consider timetable capacity beyond Rugby.

This assessment concerns compliance with Timetable Planning Rules (TPRs) only and does not consider other areas of capacity such as power, or the ability to operate the service reliably.

Assessment Commentary

The December 2022 timetable restructure of the WCML unlocked additional timetable capacity, above the pre-covid timetable levels, on the Fast Lines of the WCML. This led to ORR granting access rights on a contingent basis for an additional hourly London to Liverpool service and on a firm basis for 5 trains per day (tpd) arriving/departing at London Euston, run by open access operator Grand Union Trains (GUT), now First Rail Stirling: 4 tpd between London and Stirling and 1 tpd starting/ terminating short at Preston.

As part of the Interacting Rights workstream several other operators are looking for paths, which due to their long-distance characteristics would normally be planned using the Fast Lines on the south of the WCML. An understanding of the remaining capacity on the WCML is required to help Network Rail in responding to a number of unsupported access applications submitted to the ORR.

The December 2022 Event Steering Group (ESG) produced a Concept Train Plan with the Standard Hour timetable pattern for departures/ arrivals at Euston as shown below (Table 1 and Table 2). Note that the xx.20 and xx.36 paths from Euston (in the Down direction), and the xx.00 paths (arriving in the Up direction) operated in a limited number of hours only, as these paths were created specifically for the GUT Euston-Stirling services and the Avanti Euston-Blackpool services, both of which were expected to only operate in certain hours. The xx.36 paths from Euston act as firebreak paths in the hours when they aren't utilised.

Down Direction			
Time	Destination	Stock	Notes
xx:02	North Wales	80x	
xx:07	Liverpool	390	2nd Liverpool
xx:10	Birmingham	390	
xx:13	Manchester	390	
xx:16	Birmingham	80x	Calls WFJ, MKC, RUG
xx:20	OA	MU Stock	Call MKC.
xx:23	Birmingham	350	Cross at Ledburn
xx:30	Scotland	390	
xx:33	Manchester	390	
xx:36	Blackpool	EPS Stock	Combines with xx:20 at MKC.
xx:40	Scotland	390	via BHM
xx:43	Liverpool	80x	
xx:46	Crewe	350	

Down Direction			
Time	Destination	Stock	Notes
xx:53	Manchester	390	
xx:56	Birmingham	350	Cross at Ledburn

Table 1: Down direction Standard Hour pattern

Up Direction			
Time	Origin	Stock	Notes
xx:03	Liverpool	80x	
xx:06	Birmingham	390	
xx:09	Manchester	390	
xx:12	Scotland	390	
xx:17	Birmingham	350	Cross at Ledburn
xx:24	Crewe	350	Is on Headway with Scotland at Rugby
xx:27	Manchester	390	
xx:30	Liverpool	390	2nd Liverpool
xx:35	North Wales	80x	
xx:38	Scotland	390	via BHM
xx:41	Manchester	390	
xx:50	Birmingham	350	Cross at Ledburn
xx:54	Birmingham	80x	
xx:57-xx:00	OA	At least MU	

Table 2: Up direction Standard Hour pattern

The above timings suggest potential opportunities for paths to arrive in Euston between xx:57 and xx:00 and depart at either xx:20 or xx:36. The structure of the timetable is such that a non-tilt stock not capable of using the Enhanced Permissible Speed on West Coast South can depart at xx:20 with a call in Milton Keynes Platform 5 where it is overtaken by the xx:30 and xx:33 departures where it ends up running in the paths of the xx:36 departure. This means that either the xx:20 or xx:36 paths can be used if the intention is for the service to continue from Milton Keynes further north on the Fast Lines but would not work with both paths accommodating long-distance services in the same hour.

Work has been connected within the Northwest and Central (NW&C) region to look at the committed rights of trains within these paths and if they are currently operational. This assessment is intended to demonstrate where the remaining timetable capacity exists on West Coast South within the current timetable structure.

The following tables show that capacity does potentially still exist within the current timetable structure, between London Euston and Rugby. However, linking them to form a coherent service to/from locations beyond Rugby, may prove a challenge due to capacity constraints elsewhere.

Down Direction (0600-2000)				
	Free		Dec 24 Timetable	Service in front (T-3 punctuality at Rugby)[1]
06:20	No, WMT	Could go at 06:02 in No right Blackpool path	Blackpool Not in Dec 24	
06:36	No, Scotland		A Liverpool In Dec 24	
07:20	No, GUT			
07:36				
08:20	Yes			
08:36				1H63 (47 %)
09:20	No, Blackpool	Blackpool has No rights	Not in Dec 24	
09:36				1H64 (57 %)
10:20	No, GUT			
10:36				
11:20	Yes			
11:36				1H66 (58 %)
12:20	Yes			
12:36				1H67 (63 %)
13:20	No, GUT			
13:36				
14:20	Yes			
14:36				1H69 (64 %)
15:20	NMT			
15:36				
16:20	No, GUT			
16:36				
17:20	WMT	WMT Cross to SL at MKC so xx:36 path can be used	In Dec 24	
17:36	Yes			1H72 (36 %)
18:20	WMT	WMT Cross to SL at MKC so xx:36 path can be used	In Dec 24	
18:36	Yes			1H73 (27 %)
19:20	Yes			
19:36				1H74 (35 %)

Table 3: Down Direction potential opportunities in Dec 22 Concept Train Plan, existing usage and associated rights

[1] On the WCML south of Rugby, punctuality based on June '24 timetable as at 20.10.2024

Up Direction 0600-2200				
	Free		Dec 24 Timetable	Service in front (T-3 punctuality at Watford Jn)[1]
06:58	No, Sleeper		In Dec 24	
07:58	No, Lancaster		In Dec 24	
08:58	No	08:58 path from Manchester only has rights in December 2024	In Dec 24	
09:58	No, GUT			
10:58	Yes			9A31 (46 %)
11:58	(GUT is on hour)			
12:58	No, Blackpool	Blackpool has No rights	Not in Dec 24	9M50 (36 %)
13:58	NMT			
14:58	(GUT is on hour)			
15:58	(Blackpool on Hour)	Blackpool has no Rights	Not in Dec 24	9A53 (59 %)
16:58	Yes			1B49 (37 %)
17:58	No	ECS move to enable 2B51 (WMT) operates in this slot		
18:58	Yes			1Y46 (46 %)
19:58	(GUT is on hour)			
20:58	Yes			1A72 (41 %)
21:43	No, Chester	Chester has no rights	Not in Dec 24	
21:58	Yes			9M59 (33 %)

Table 4: Up Direction potential opportunities in Dec 22 Concept Train Plan, existing usage and associated rights

This leads to 9 possible paths per day in each direction (Up and Down) at Euston on the West Coast, after the inclusion of GUT and the 2nd Liverpool service that both have rights. No consideration was given to whether these services could be platformed and accommodated robustly at London Euston at these times. However, the original December 2022 plan was planned to operate with 15 platforms due to uncertainty around the future availability of platform 16 (which was previously planned to be temporarily taken out of use as part of the High Speed 2 construction works).

If platform 16 was to be utilised it would allow greater flexibility; however, current HS2 work at Euston is still paused against the original scope which, if re-started, would see the temporary removal of P16 to support construction. It may be the case that impending decisions concerning HS2 and Euston will mean that works have less impact on the station, but this is subject to instruction from Government once reviews and the decision-making process have concluded.

Down Free paths 0600-2000	Down Paths against a train with no Rights 0600-2000	Total
7	2	9
Up Free Paths 0600-2200	Up paths if no rights train removed 0600-2200	Total
5	4	9

Table 5: Potential timetable capacity (quantum)

Additional Considerations

The above assessment shows the capacity that potentially exists within the current SX timetable structure between London Euston and Milton Keynes. However, it does not consider the performance implications if some, or all, of this capacity was used. The quantum of 13 trains per hour on the Fast Lines, with the occasional increase to 14 tph, was modelled during the ESG and shown to have better performance than the December 2019 timetable; however, the performance modelling conducted looked at a full day. Therefore, the impact on performance of the increased trains per hour in the hours the GUT services ran would be diluted across the day. The modelling suggested that the quantum of services in the December 2022 Concept Train Plan was the maximum that could be robustly accommodated without causing an unacceptable detriment to performance.

High-level commentary on the performance risk of utilising timetable capacity opportunities against the June 2024 timetable is included in Appendix A.

In addition to the train performance considerations, passenger flow considerations at Euston Station should also be taken into account. Passenger flow at London Euston is currently a concern, with Network Rail having been issued an improvement notice in October 2023, by ORR, in relation to passenger surges and overcrowding. Passenger flow remains a concern, despite ORR having closed the improvement notice. The current level of service, which does not reflect all rights held by operators, has created allegations of unsafe situations arising during times of perturbation reflected in recent media reports:

- Rail Magazine, 07 October 2024 - https://www.railmagazine.com/news/2024/10/07/passengers-are-in-danger-at-london-euston-says-watchdog#:~:text=Passengers%20using%20London's%20Euston%20station,the%20sheer%20numbers%20of%20people.%E2%80%9D

- BBC News 08 October 2024 - https://www.bbc.co.uk/news/articles/cj31v6dgy3xo

- The Guardian 02 October 2024 - https://www.theguardian.com/business/2024/oct/02/overcrowding-at-london-euston-station-puts-passengers-in-danger

The combination of the introduction of new services driving performance concerns as well as an increase from new opportunities of passenger demand at Euston station will require scrutiny of the pedestrian flow to avoid increasing the challenges of managing pedestrian flow at the station.

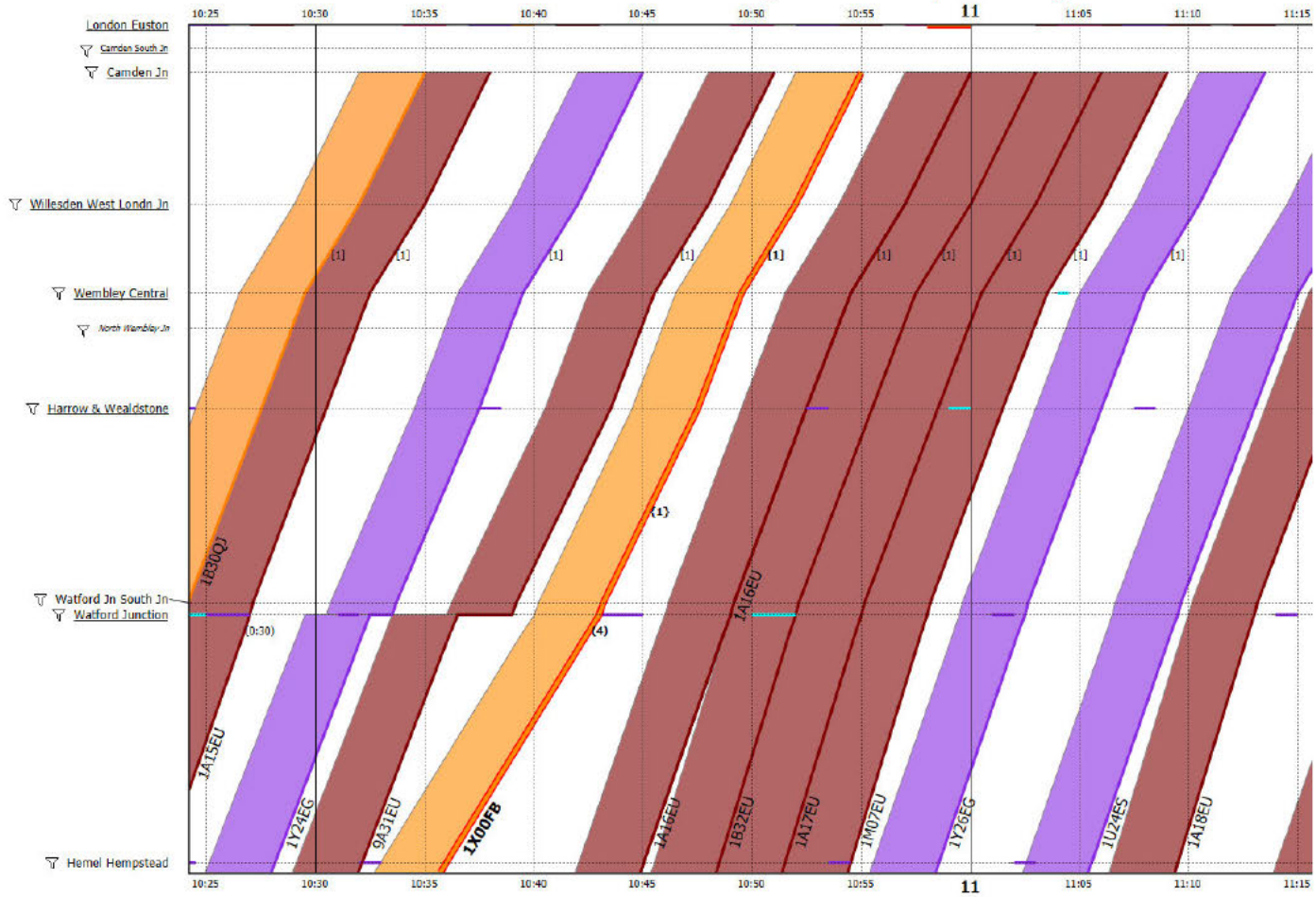
Network Rail therefore intends to undertake an assessment based on the quantum of services within the December 2022 Concept Train Plan. There also remains a restricted number of platforms at London Euston, with no funded plans to re-introduce a 17th and 18th platform. Passenger flow is primarily focused on number of passengers at a station at a given time, with arrivals and departures rather than requiring knowledge of origin or destination. It will therefore be possible to achieve a good understanding of the risk profile based on the quantum of services and associated passenger numbers within the Concept Train Plan, forming a basis which will allow for qualitative assessment of any differences.

Appendix A - June 2024 Timetable performance commentary on train slots

The following commentary describes the performance of services in the existing timetable, June 2024, which immediately precede the opportunities available for additional services to operate identified in the body of this report. This permits an approximate understanding of the level of performance risk associated with utilising each opportunity (hereafter referred to as "slots"). In the current timetable each one of these unoccupied slots helps to inhibit the spread of delay from late-running services to other services by providing a 'buffer' within the timetable structure. These unfilled slots in the timetable structure are often referred to as "firebreaks" and that term is used for brevity in this section. Not all rights held by operators are reflected in the current, June 2024, timetable.

In the train graphs which follow, the train slot being referred to in each section is highlighted and coloured orange. Some additional, currently unused, paths are also included (similarly coloured orange); these paths represent proxy paths for services which have rights already granted for future timetables. These paths are identified to test for potential interactions and conflicts with other aspirations.

1058 Arrival at London Euston (6-minute slot following 9A31 and preceding 1A16)



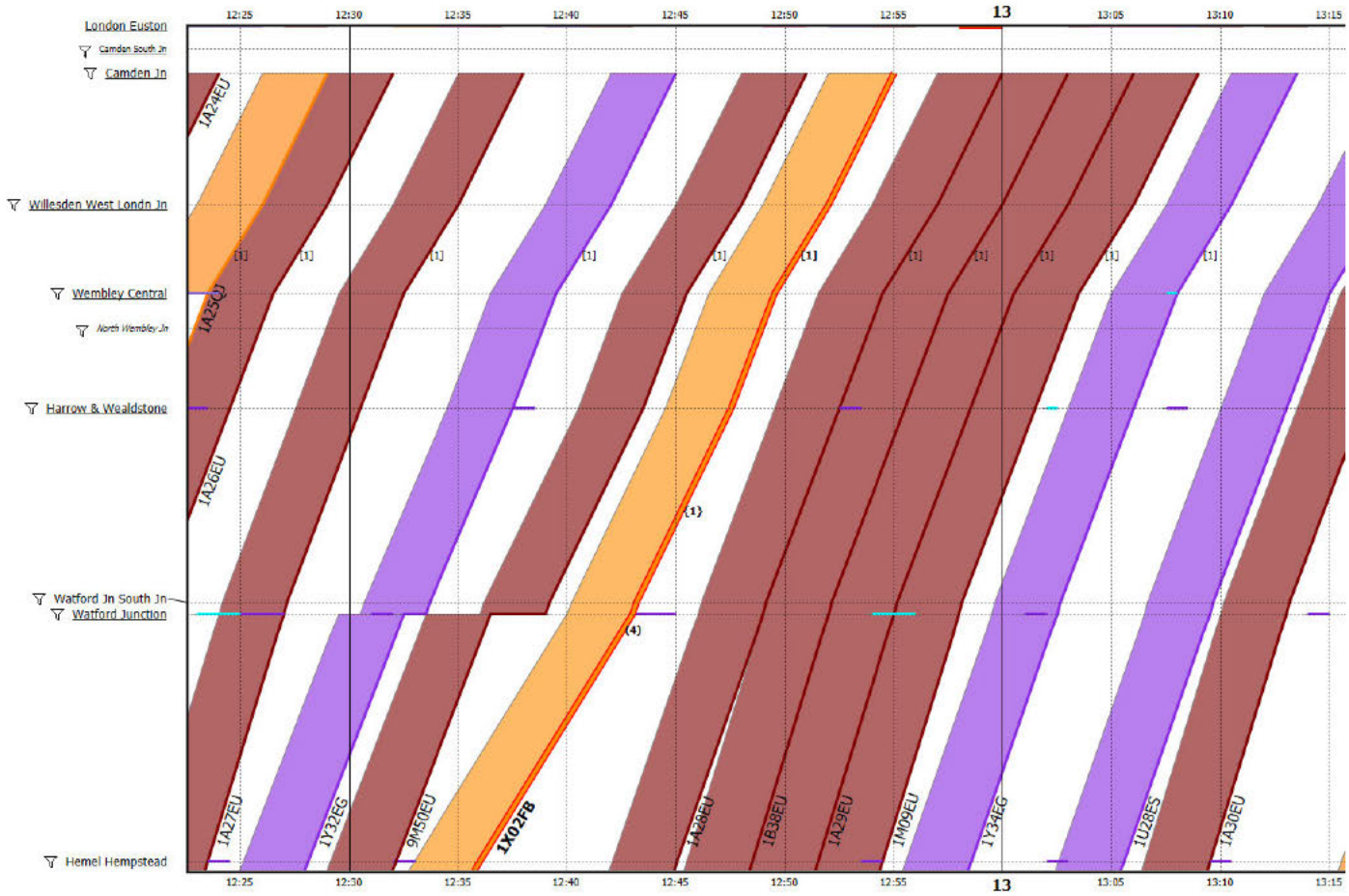
Making use of this arrival slot at London Euston requires a new service to follow 9A31 0700 Lancaster – London Euston from Rugby. 9A31 is planned to depart Rugby on a minimum margin behind 1A15 0835 Manchester Piccadilly – London Euston and then call at Milton Keynes Central and Watford Junction. 1A15 is on-time 16 % of the time at Rugby and therefore frequently causes reactionary delay to 9A31. 9A31 consequently is more than 3 minutes late at Watford Junction 54 % of the time.

Filling this firebreak in the timetable structure means there is an increased risk of delay from 9A31 affecting the tightly-spaced flight of five trains 1A16, 1B32, 1A17, 1M07 and 1Y26 and causing five on-time failures at London Euston.

1258 Arrival at London Euston (6-minute slot following 9M50 and preceding 1A28)

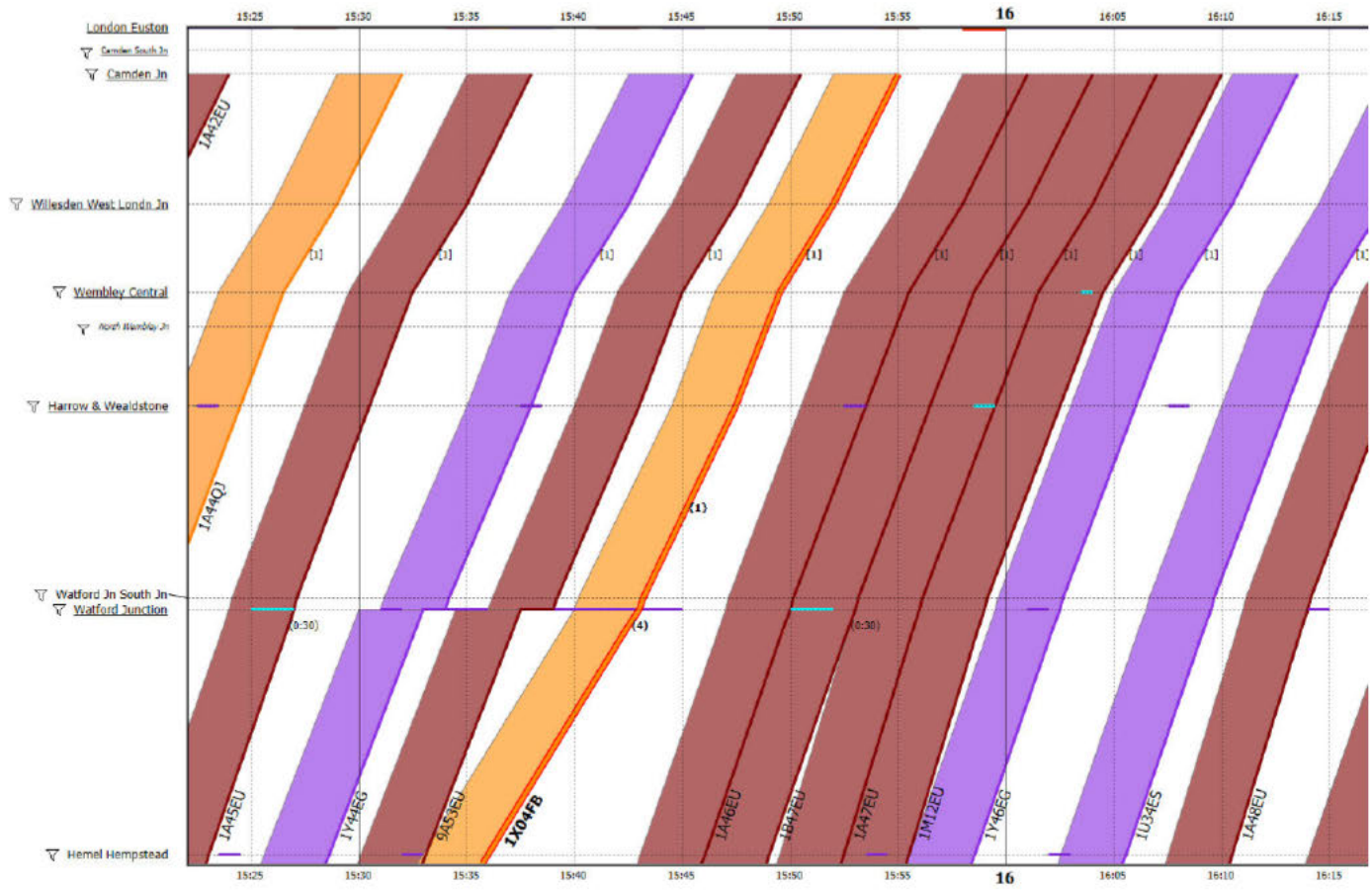
The slot which arrives at London Euston at 1258 follows a similar timetable pattern to the one that arrives at 1058. The difference is that 9M50 has started from Edinburgh rather than Lancaster. 9M50 itself follows 1A27 which is on-time 10 % of the time at Rugby. This contributes to 9M50 being more than 3 minutes late at Watford Junction 64 % of the time.

The risk of reactionary delay from 9M50 flowing through to the flight of 1A28, 1B38, 1A29, 1M09 and 1Y34 (all on minimum headways) by filling this gap is significant.



1558 Arrival at London Euston (7-minute slot following 9A53 and preceding 1A46)

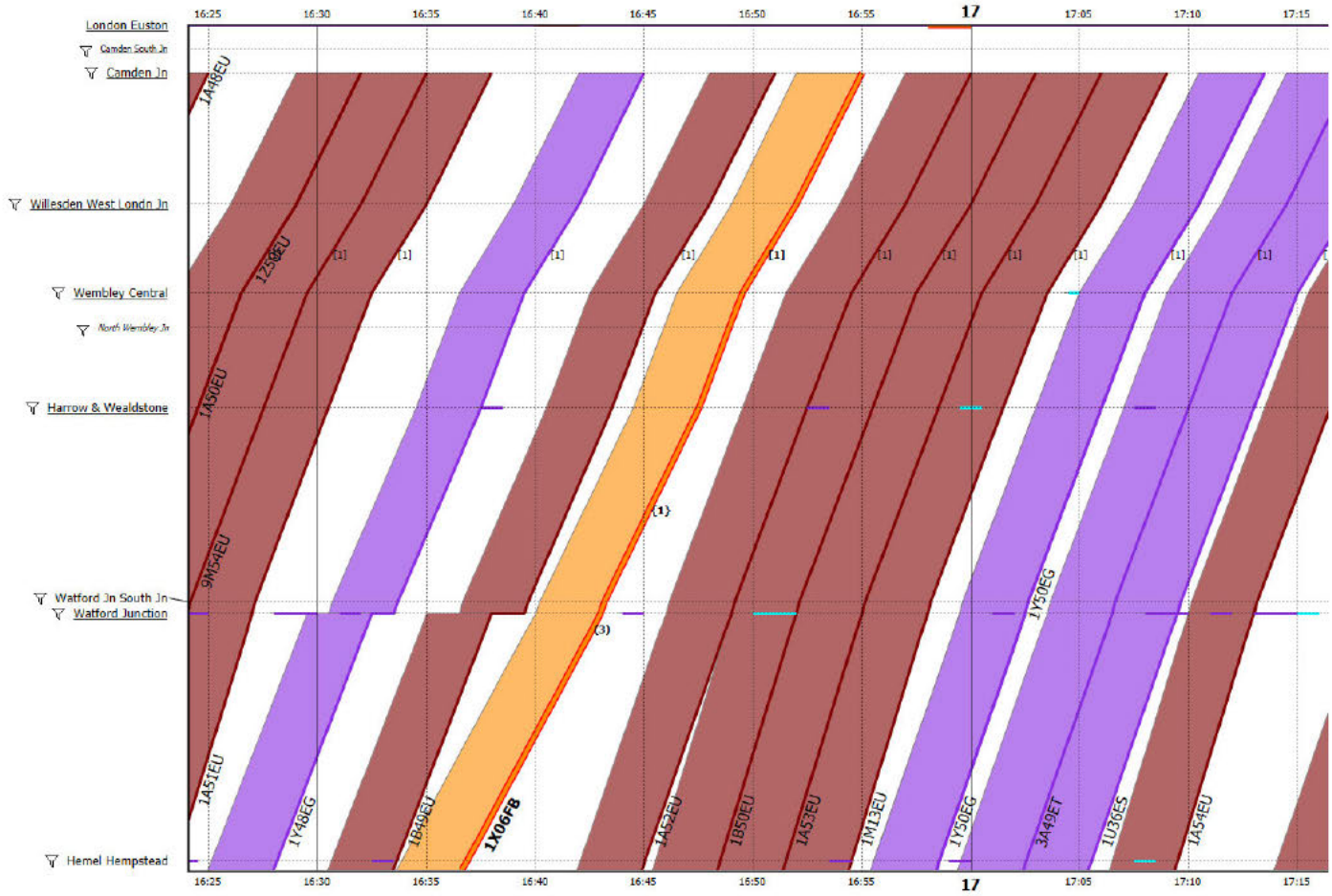
9A53 is more than three minutes late at Watford Junction 41 % of the time. This indicates the number of occasions when filling this slot would result in reactionary delay flowing to 1A46 and the flight of four services behind it.



1658 Arrival at London Euston (6-minute slot following 1B49 and preceding 1A52)

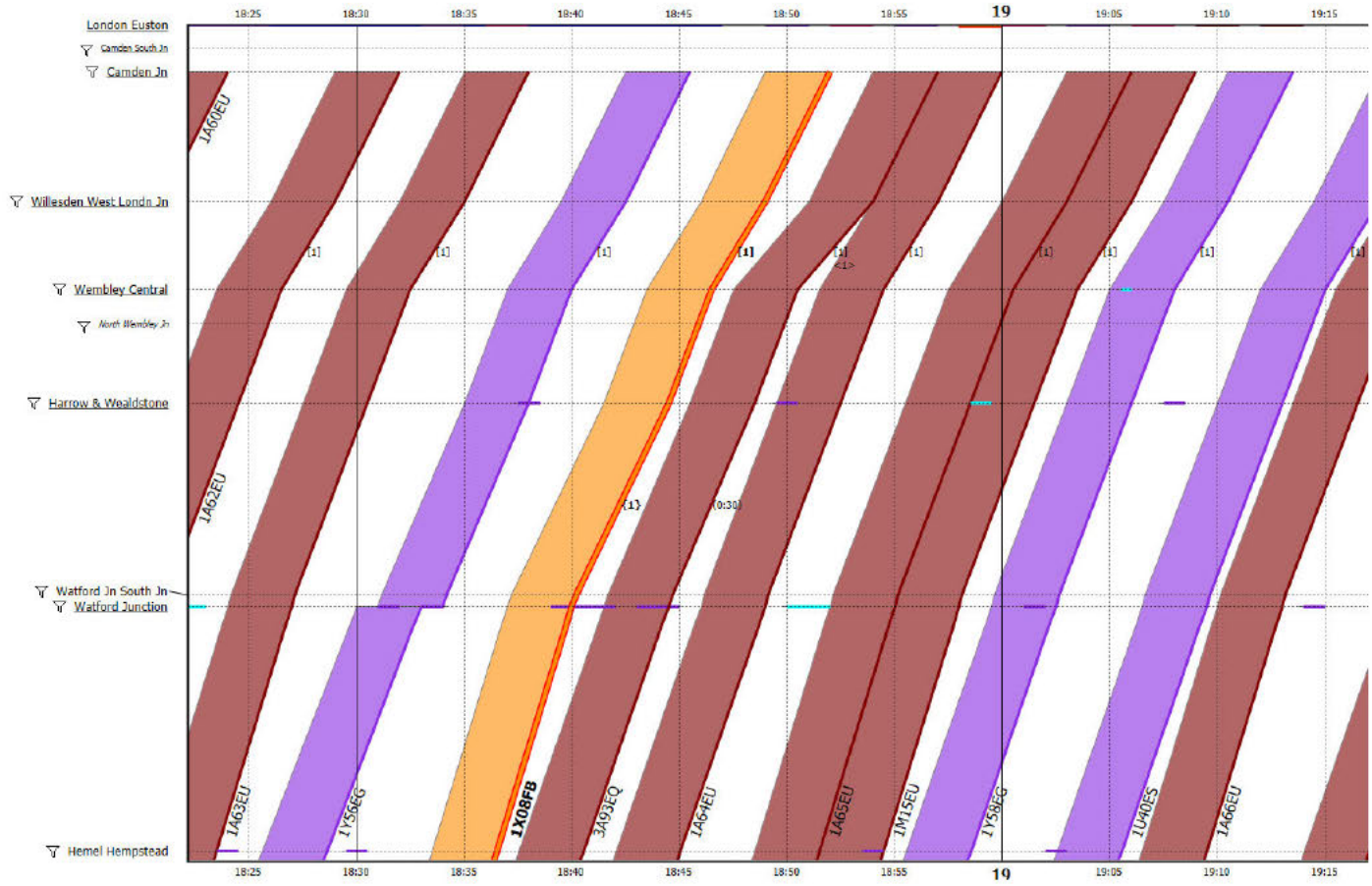
This timetable slot is similar to the previous three examples in that it is following a semi-fast service (in this case from Birmingham New Street) and precedes a flight of five services on minimum headways. The difference is that the timetable pattern arriving into Euston just before the evening peak is more intense in this hour because there is a high-priority Empty Coaching Stock (ECS) movement 4 minutes after 1Y50. This effectively means there is the flight of five services then a one-minute gap and this ECS movement which is minimum headway before another express services. It is nearly inevitable that any delay to 1A52 will ripple through 1B50, 1A53, 1M13, 1Y50, 3S49, 1U36 and 1A54 causing seven passengers services to arrive late at Euston.

The firebreak in the timetable is therefore particularly important to maintain at this point. 1B49 is later than three minutes at Watford Junction 63 % of the time.



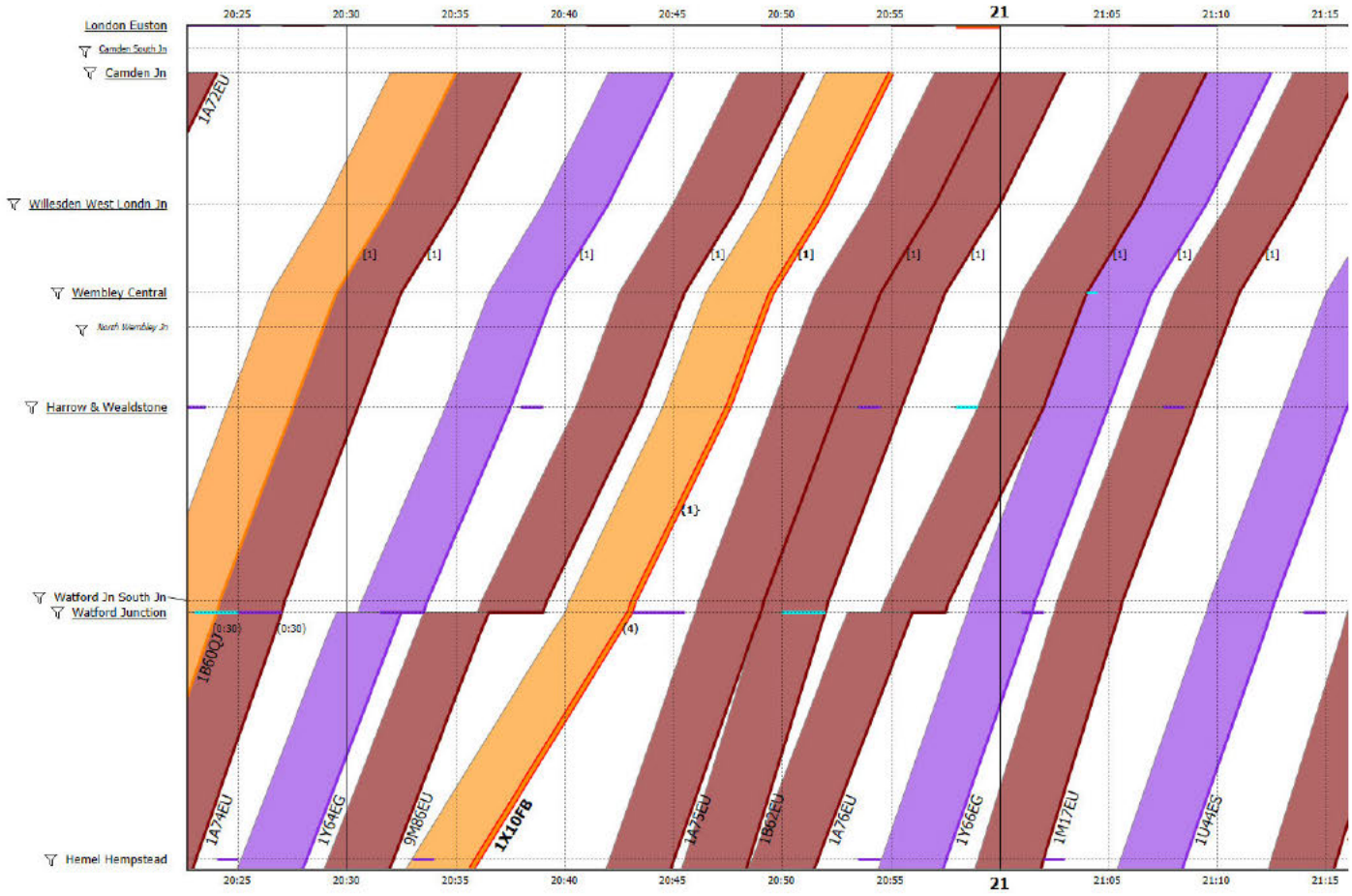
1858 Arrival at London Euston (6-minute slot following 1Y56 and preceding 3A93)

1Y56 is more than three minutes late at Watford Junction 54 % of the time. This slot is however lower risk than many of the others because the following service is empty stock that has a small gap before the following service (1A64) and then there is a firebreak between 1A64 and 1A65. The additional recovery available in the pattern reduces the likelihood of reactionary delay impacting as many services as the previous examples.



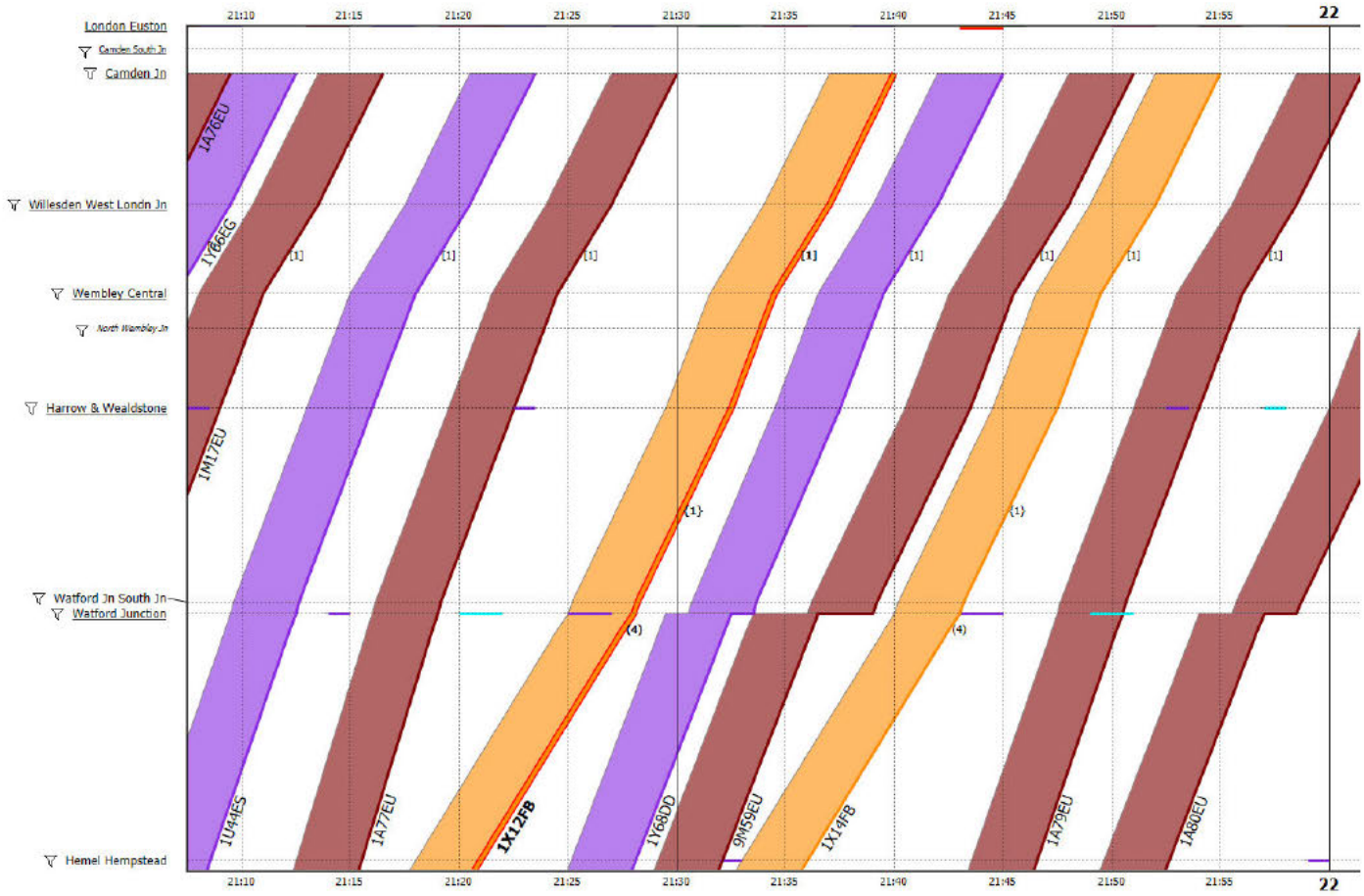
2058 Arrival at London Euston (5-minute slot following 1A72 and preceding 1B60)

1A72 is later than three minutes 59 % of the time at Watford Junction. Whilst this slot is later in the day then the previous examples there still remains significant risk of increasing reactionary delay through filling it as this slot is the smallest gap of the Up direction slots examined in this analysis and is followed by two express services flighted together (1A75 and 1B62). Delays north of Watford Junction would also impact 1A76 and the two services which follow it (1Y66 and 1M17).



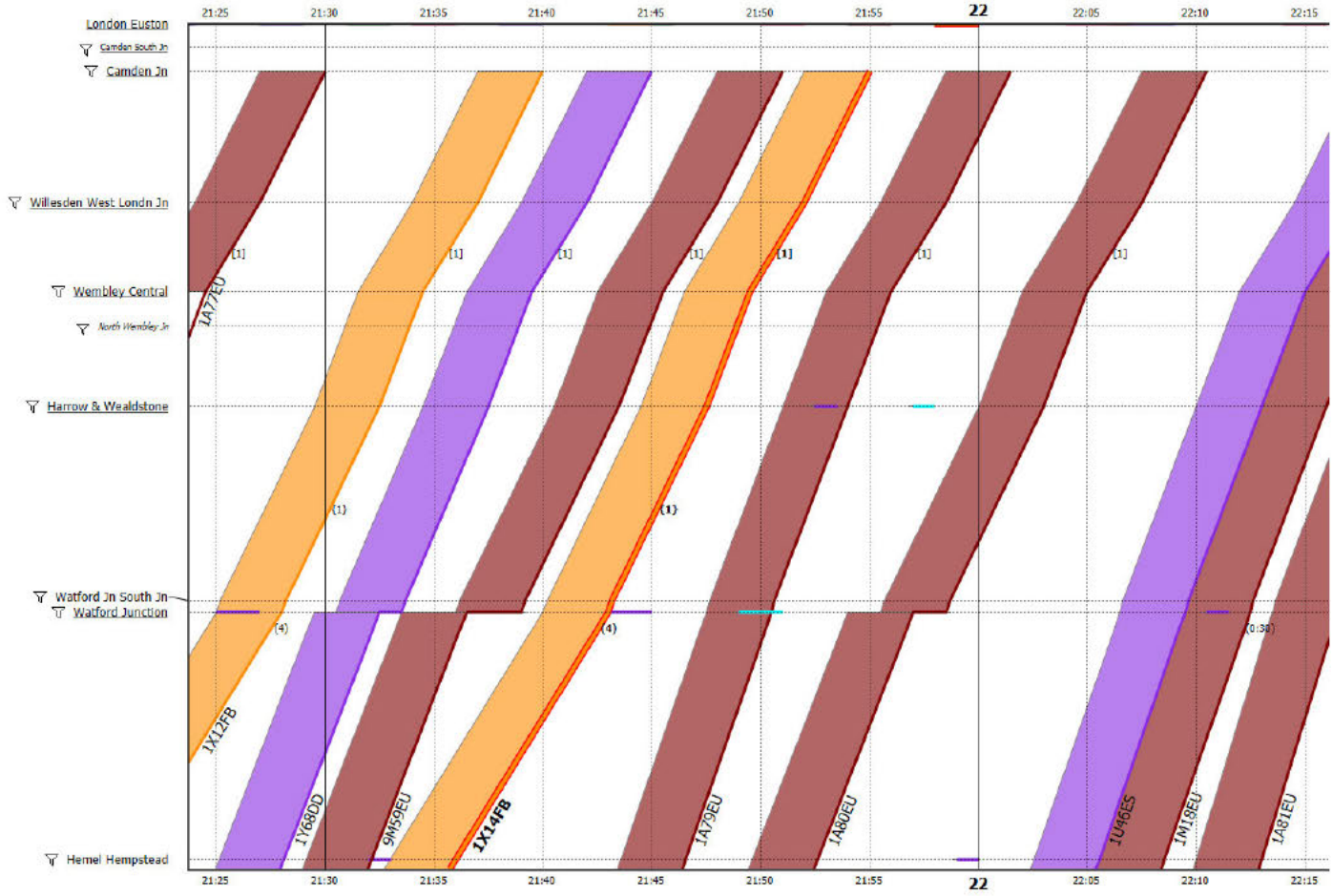
2143 Arrival at London Euston (8½-minute slot following 1A77 and preceding 1Y68)

1A77 is more than three minutes late at Watford Junction 67 % of the time which is a high likelihood however this slot is lower risk south of Rugby than many of the others because it is larger and does not precede a group of flighted services on minimum headways.



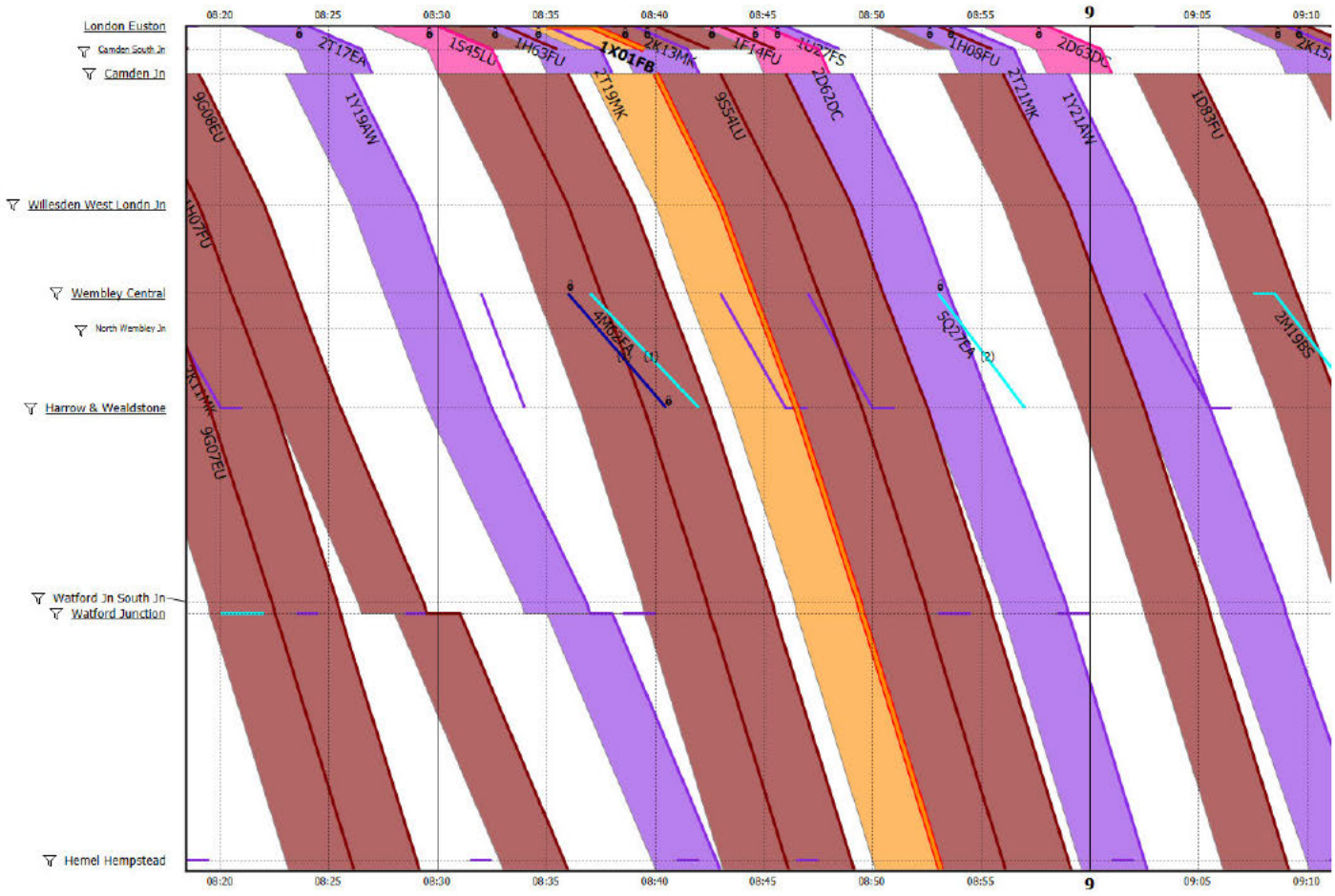
2158 Arrival at London Euston (7½ -minute slot following 9M59 and preceding 1A79

9M59 is more than three minutes late at Watford Junction 67 % of the time however there is recovery time around following services to reduce the chance of reactionary delay impacting multiple services meaning that collectively there is low risk south of Rugby to using this slot from a performance perspective.



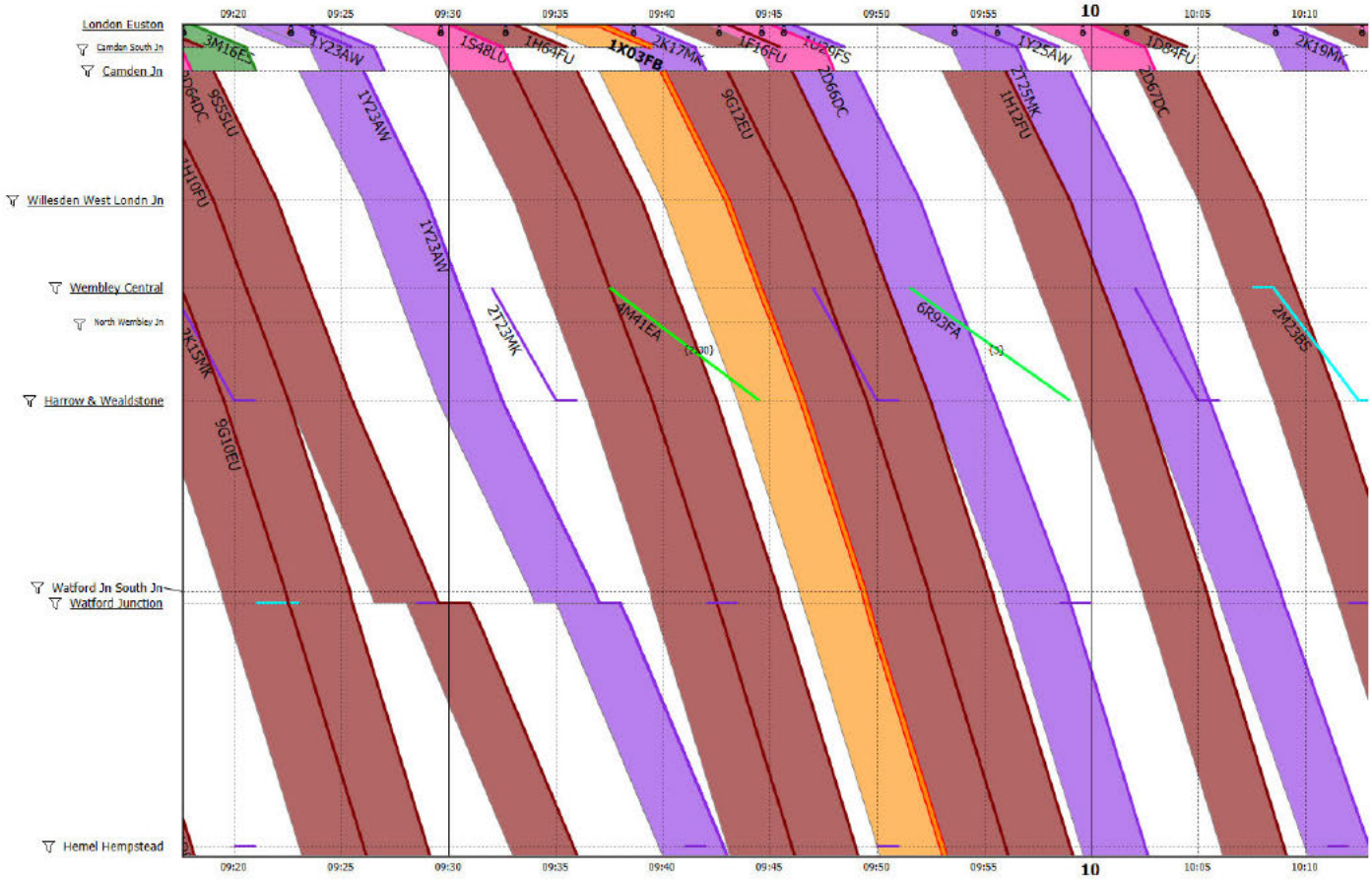
0836 Departure from London Euston (3½-minute slot following 1H63 and preceding 9S54)

Filling in the slot behind 1H63 effectively takes two separate three-train flights (1Y19, 1S45, 1H63 and 9S54, 1F14, 1U27) and would form them in to one continuous flight of seven services on, or close to minimum headways at points on the south end of the WCML (south of Rugby). 1H63 is more than three minutes late at Rugby 53 % of the time and a contributing factor in that lateness is 1Y19 at the start of the initial flight being more than three minutes late by the time it cross to the Slow Lines at Ledburn Jn 41 % of the time.



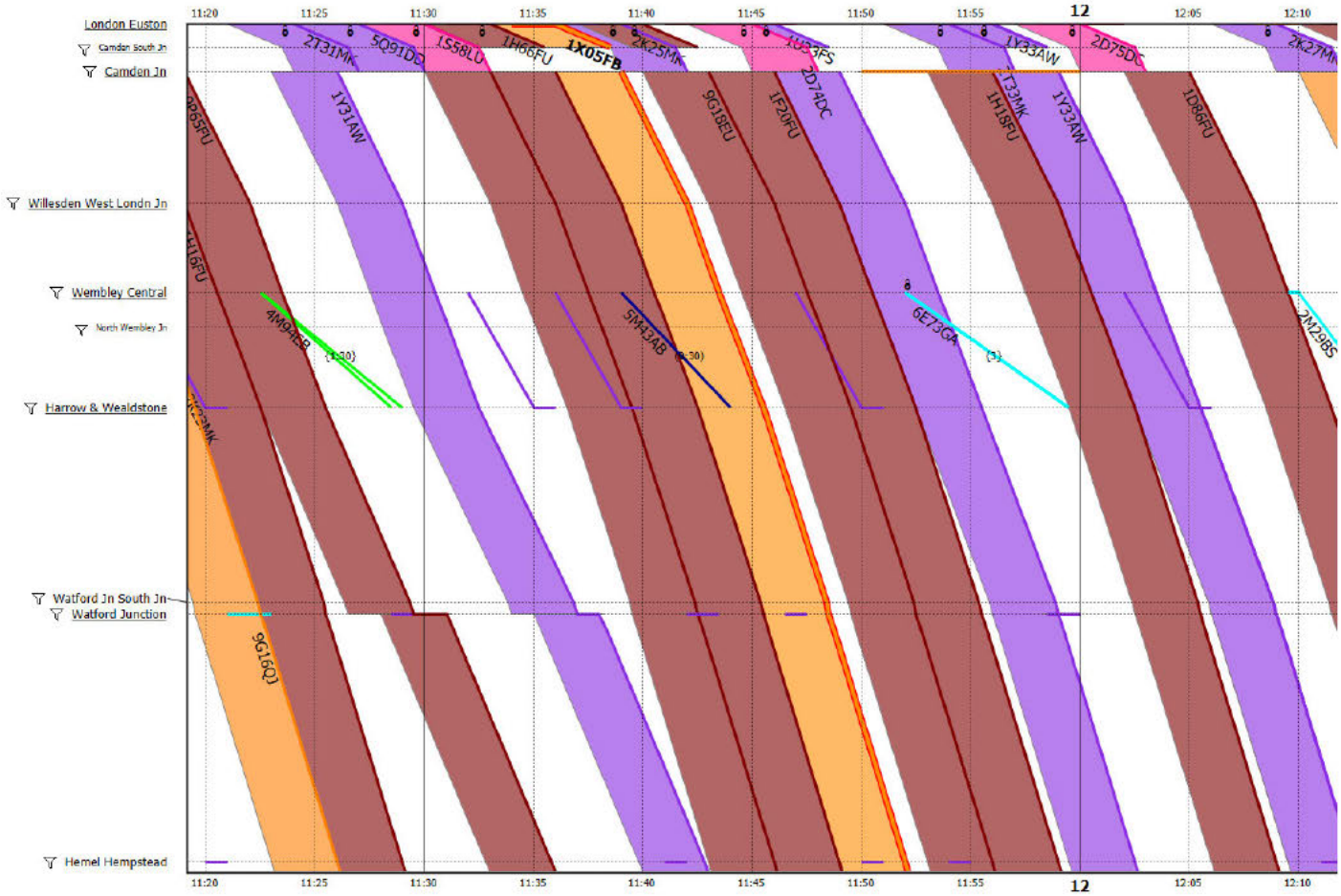
0936 Departure from London Euston (3½-minute slot following 1H64 and preceding 9G12)

As per the previous Down slot, adding an 0936 departure from London Euston will create a continuous flight of seven service on or near minimum headway instead of two flights of three services. There will be very high likelihood of delay by the end of the flight. 1H64 is more than three minutes late by Rugby 43 % of the time.



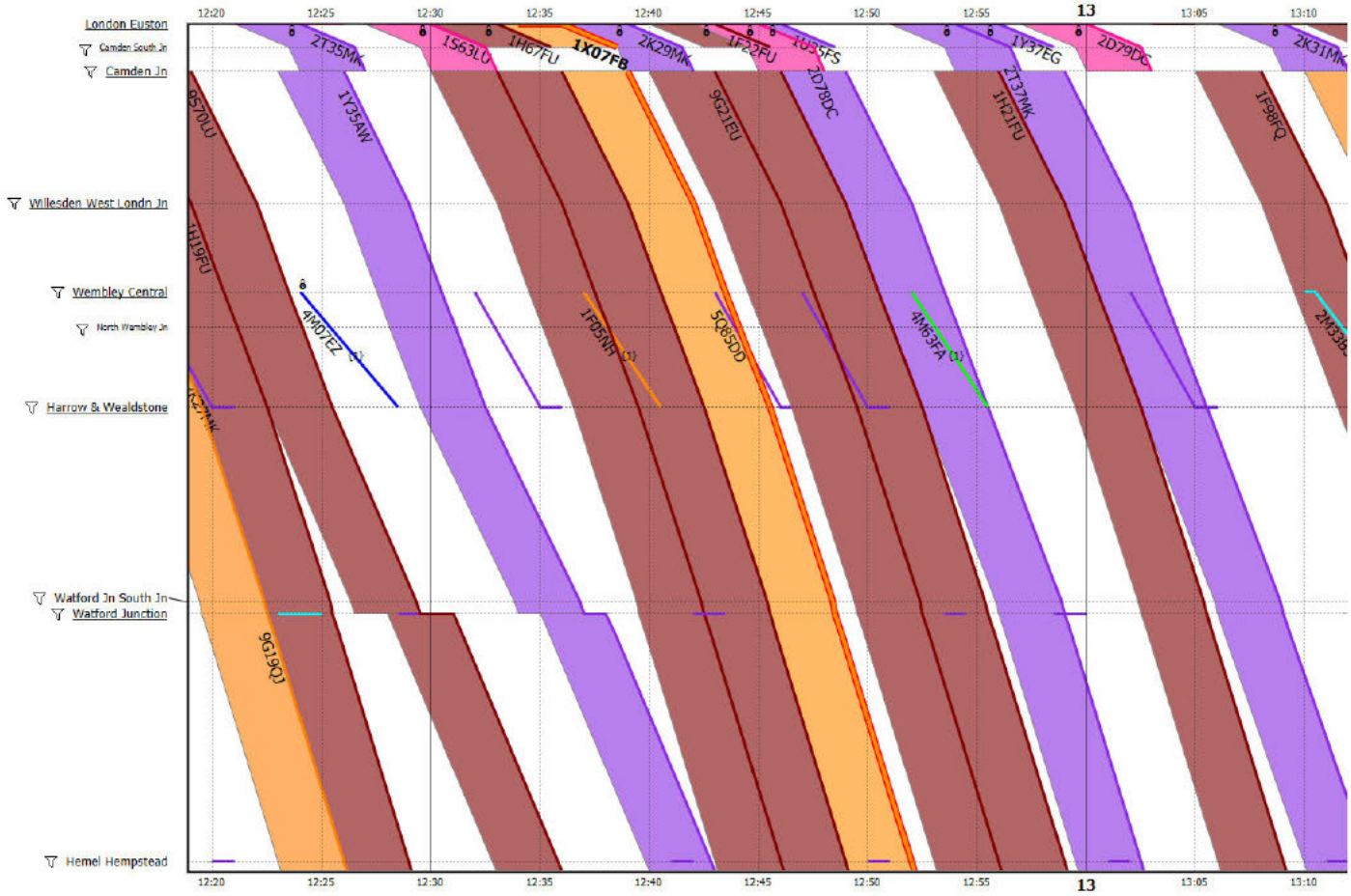
1136 Departure from London Euston (3½-minute slot following 1H66 and preceding 9G18)

Continuing the theme of creating long flights of services on minimum headway using this slot will also create a continuous flight of seven services at or near minimum headway. 1H66 is more than three minutes late 42 % of the time.



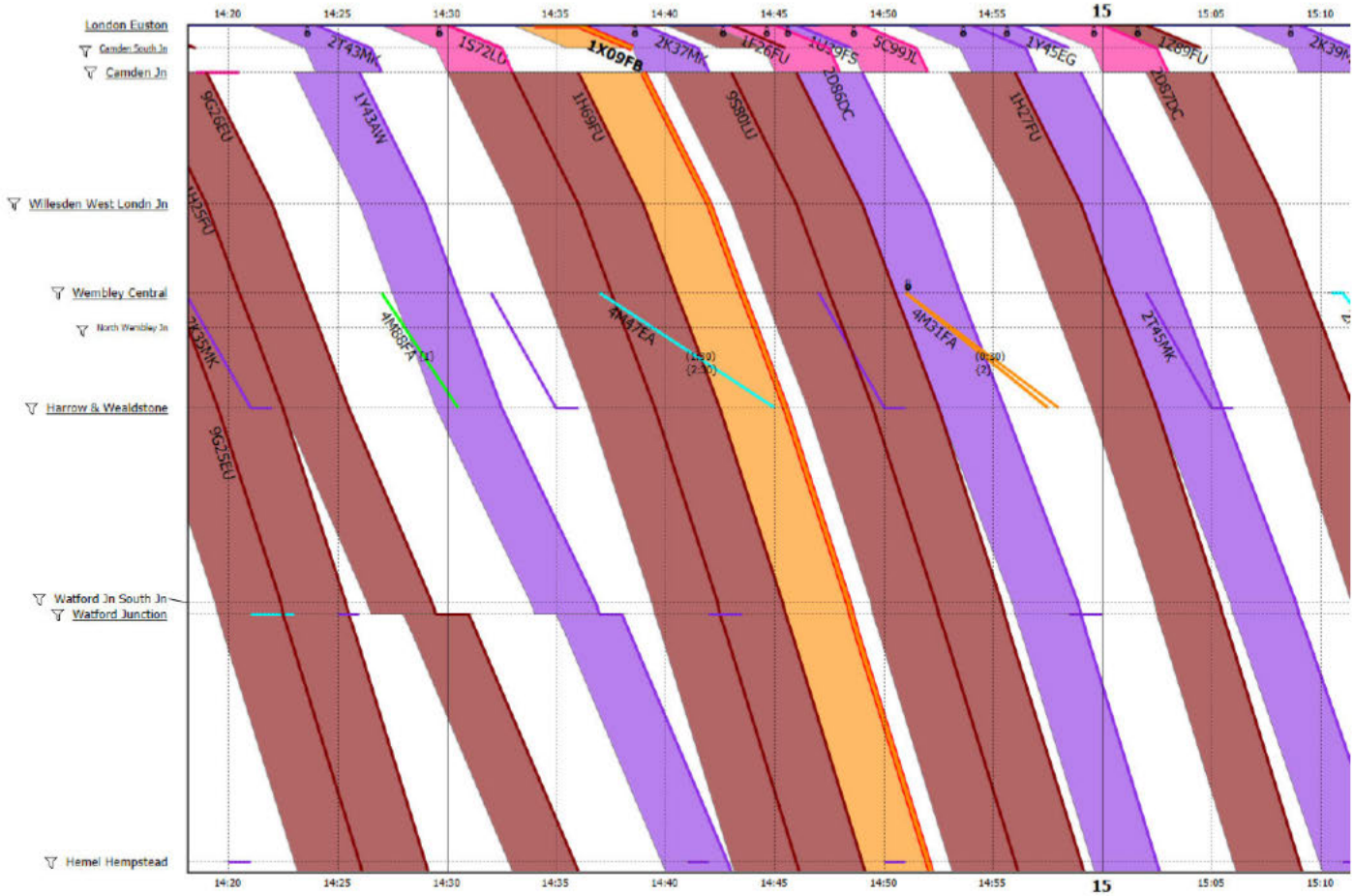
1236 Departure from London Euston (3½-minute slot following 1H67 and preceding 9G21)

Due to the standard-pattern nature of the middle of the day, this slot again has very similar characteristics to the previous Down direction slots. Creation of a flight of seven services at or near minimum headway places the services at the end of that sequence at significant risk of reactionary delay. 1H67 is three or more minutes late by Rugby 37 % of the time. This is more often than one day in three.



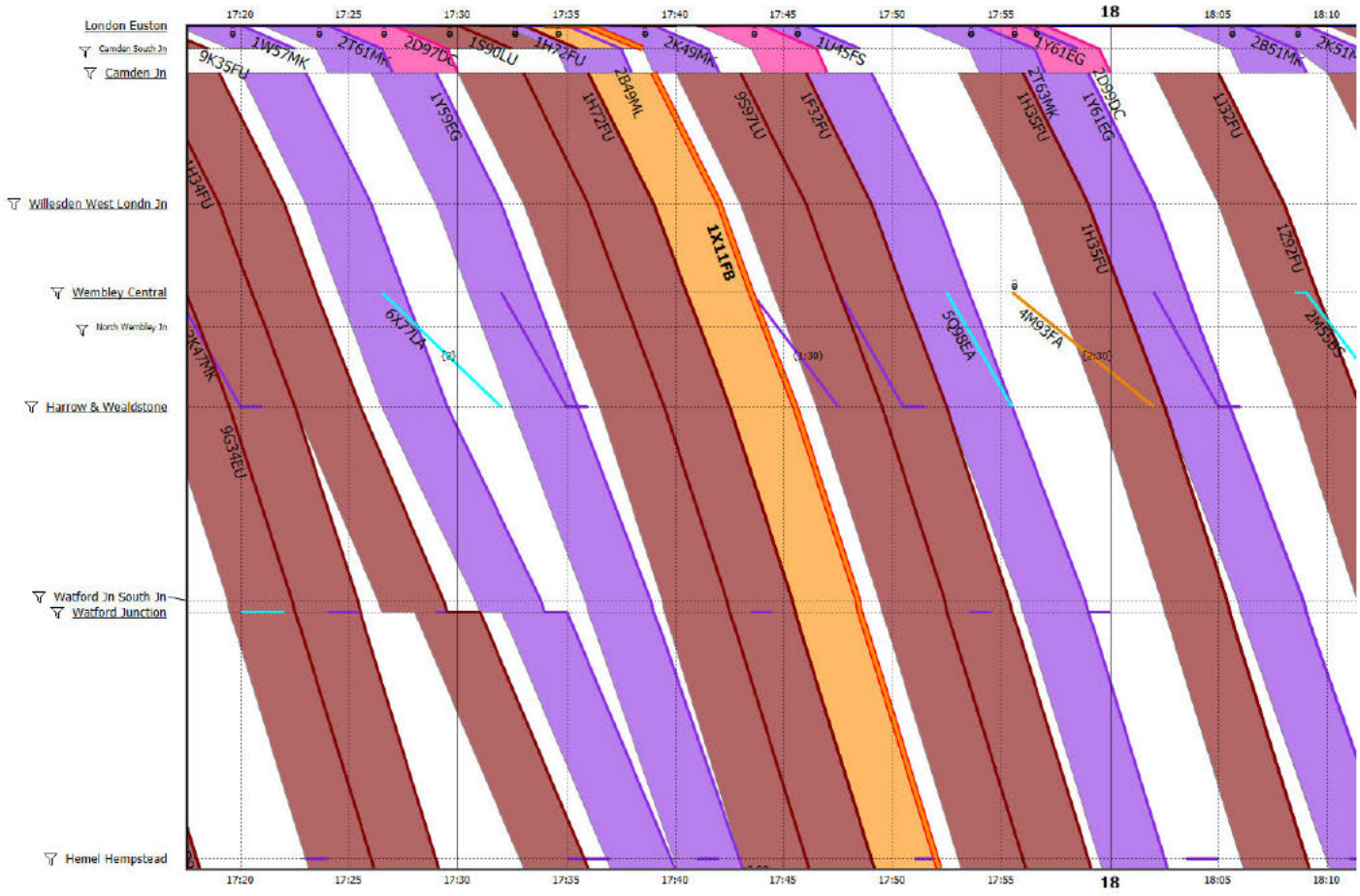
1436 Departure from London Euston (3½-minute slot following 1H69 and preceding 9S80)

This slot has the same characteristics as the previous Down examples. 1H69 is three or more minutes late by Rugby 36 % of the time.



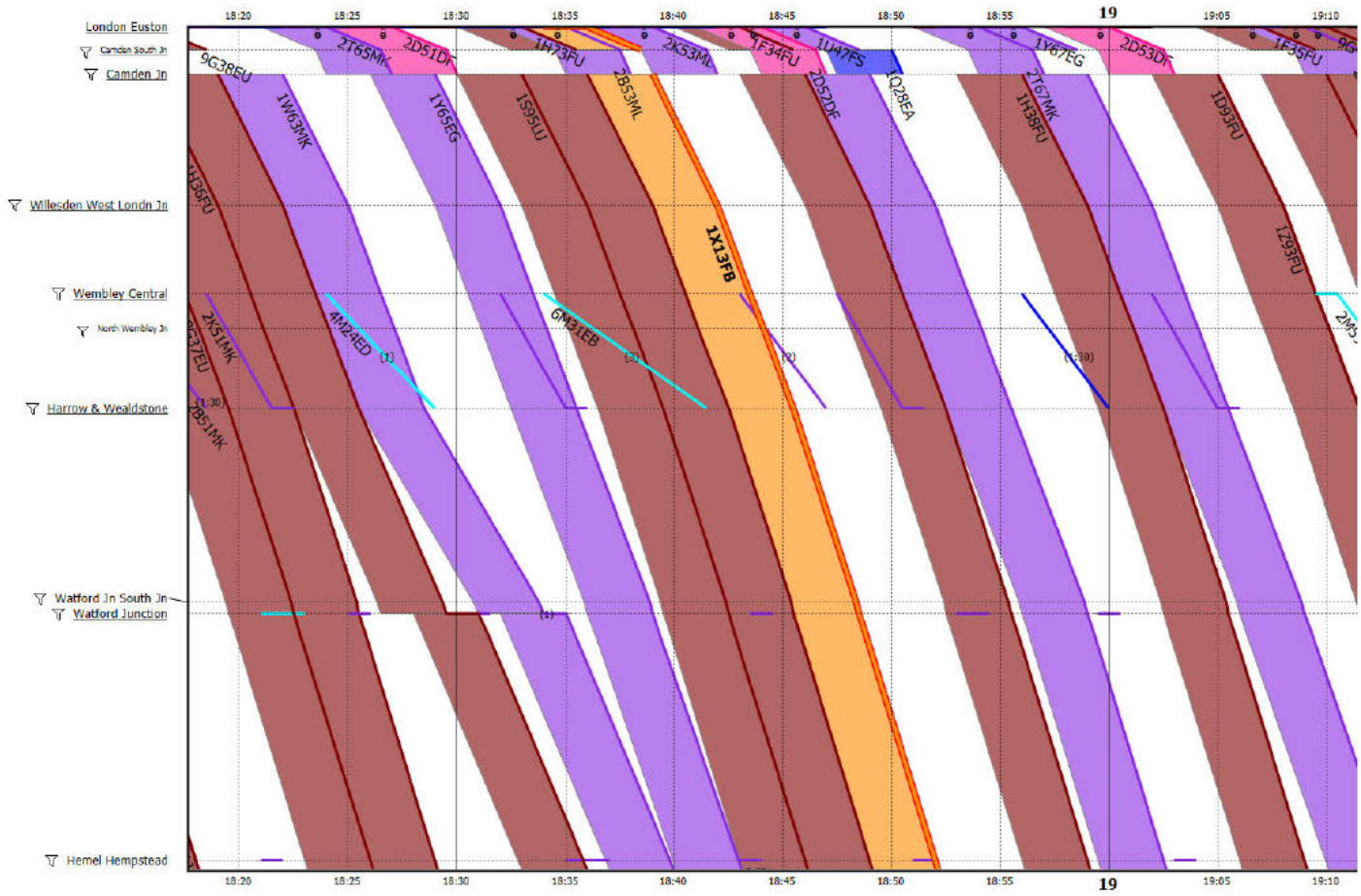
1736 Departure from London Euston (3½-minute slot following 1H72 and preceding 9S97)

Due to the intensive nature of the evening peak departures from Euston this slot is actually high risk than all of the other Down examples referenced here. With the exception of a one-minute gap, filling this slot would create a continuous sequence of eleven services at or near minimum headway between Euston and Ledburn Junction. The effect of the existing first half of that sequence (before the firebreak) can be seen on the punctuality of 1H72 which has a notably poor punctuality record in June '24 and is three or more minutes late by Rugby 64% of days which is nearly two days in three. Given the low likelihood of the initial flight of seven services (9G34 – 1H72) avoiding reactionary delay it is practically guaranteed that filling this firebreak will result in delay to 9S97-1U45.



1836 Departure from London Euston (7-minute slot following 1H73 and preceding 1F34)

In a similar way to the previous 1736 example filling this firebreak will create a long sequence of trains at or near minimum headway on the Down Fast. In this case the slot itself is larger and the sequence created would be of ten services rather than eleven however with 1H73 being three or more minutes late 73 % of the time by Rugby the challenges of successfully departing this sequence of trains through the throat at Euston on time by this stage in the evening peak are clearly illustrated. There would be still be additional risk of reactionary delay by filling this slot although not partly mitigated by the second unfilled slot behind it.



1936 Departure from London Euston (3½-minute slot following 1H74 and preceding 9K42)

This slot returns to a similar pattern as 1436 and earlier slots where a seven-train flight of services on or near minimum headway would be created by filling it. 1H74 is three or more minutes late by Rugby 65 % of the time so the chance of that reactionary delay occurring once the firebreak has been filled is significant.